

converge into an unvisited lake west or south-west of this." If the expression "one water" here means that these two lakes are united by an extension of one into the other, and not by a river, then it is evident that the river and lake chain under consideration can never flow up to join either of them after having passed down through the rent in the Mountains of Rua; if it means that these lakes are joined together by a river, still the small difference in height between that computed for Lake Tanganyika by Mr. Finlay, of 2,800 feet (afterwards so curiously confirmed by Livingstone's height of Lake Liemba), and that found for the Albert Nyanza by Baker, would not give a sufficient lowness to the latter lake to allow this river to flow down to it through the five degrees of latitude which separate its outfall from the Mountains of Rua, from the southern end of the Albert Lake. Dr. Livingstone's statement in his letter above quoted from Uji, that the head waters of the Tanganyika and Albert Lakes are 300 miles south of that place, is not at all opposed to the view that the Chambeze River and its lake chain may join the Congo, for the streams which flow into his Lake Liemba may rise at this distance from Uji. In this case the sources of the Nile would be side by side with those of the Congo; and the man who has the claim to be called the greatest explorer that the world has ever known, has the double honour of having solved the two greatest of African problems.

74, Strand, W.C.

KEITH JOHNSTON, Jun.

Physical Meteorology

ASSUMING with your correspondent that there is an ascending current in the heart of a cyclone, no doubt latent heat will play its part. I presume, however, your correspondent does not imagine that air is ever actually heated by such means to 370° F.

Suppose, for instance, that two cubic feet of saturated air, both at thirty inches pressure, but one at the temperature 32° F. and the other at the temperature 90° F., become mixed. The cubic foot at 32° F. will contain 2.37 grains of vapour, that at 90° F. 14.50 grains. Hence, after mixture the average weight of vapour in unit of volume will be 8.43 grains. This would saturate a temperature = 71.7° F. But this is greater than the mean between the two temperatures or 61° F. There will, therefore, be hardly enough heat to keep the mixture at 71.7° F. and prevent deposition.

On the other hand, we cannot imagine the temperature of the mixture to fall as low as 61° F.

The temperature of the mixture will therefore, I presume, be greater than 61° and less than 71.7°.

B. STEWART

Veined Structure in Ice

FEW men have had better opportunities of examining glacial phenomena than Mr. Whymper, and his explanation of the veined structure is certainly an ingenious one. I venture, however, to doubt whether it can be regarded as generally satisfactory, although, possibly, it might explain some isolated cases.

The following, which, so far as my experience goes, are common facts in glaciers, appear to me difficult to reconcile with his explanation.

(1.) One common case in which the veined structure becomes conspicuous is after the glacier has been pressed into a narrower channel than has been occupied by its *névé*. The structure planes are then roughly parallel to the *sides* of the channel. Dr. Tyndall has pointed this out in his "Glaciers of the Alps," p. 387, and I have frequently observed the same thing myself. Three instances occur to me at this moment: one on the Gorner Glacier, under the Gorner Grat; another in the middle part of the Glacier de la Pilatte (Dauphine); a third on the upper part of the Mer de Glace. Did I search through my note-book I have no doubt I could find plenty more. If now, say in the second example, the veined structure was due to the crevasses in the ice fall below the Col du Sélé, surely its planes would hardly be twisted through a right angle in the comparatively short distance intervening between the ice fall and the rocky spur from the Crête des Bœufs Rouges which causes the "nip." Moreover, if the planes have been turned by the unequal motion of the centre and sides of the ice stream, ought we to find them so uniform in direction as they now are, often extending with a very general parallelism over the greater part of the glacier?

(2.) If the veined structure is the result of healed crevasses, how are we to explain the great number of these plates of different coloured ice on glaciers which are not remarkable for very nume-

rous crevasses. For example, on the Roseg Glacier, near Pontresina, these plates of blue and white ice alternate with each other for at least several hundred yards as you walk up the glacier, and are commonly only an inch or so thick. I have in my notebook a diagram of a piece to exhibit the weathering of the two kinds of ice, in which are shown five plates, three blue and two white. One of the former is about an inch thick, and all the rest are thinner. Each of the white is about half an inch, and I remember that this was a fair sample of most of the ice near. If, then, the crevasses, from whose healing this platy structure has resulted, were formed simultaneously or in close succession, how are we to explain the thinness of the white portion, its layers being, if anything, thinner than the blue? Crevasses are not usually so near together as this, and if they were not thus formed it is probable that the plates would be so produced as to be, for about as far as one could trace them, parallel one to another, so accurately that my diagram looks like a bit from a cliff of midland lias?

Cambridge, Jan. 7

T. G. BONNEY

Personal Equation of Astronomical Observers

IN the number for November 18, 1869, of NATURE, "J." asks if an experiment has hitherto been tried to ascertain the value of the personal equation of astronomical observers. The fact is, that it has been tried in different manners, as by Mr. Wolf in Paris, and Mr. Hirsch in Neuchâtel, but first of all by Dr. F. Kaiser, Astronomical Professor, and Director of the Observatory of Leiden. The apparatus of Prof. Kaiser was first constructed in 1851, but was afterwards highly improved, so that it is fitted equally well for observations with or without the chronograph.

A description of the method and apparatus of M. Kaiser is to be found in the "Archives Néerlandaises des Sciences exactes et Naturelles," vol. i. p. 194, and of the improved one in the reports and communications of the Royal Academy of Science of the Netherlands (Verslagen en mededeelingen der Koninklijke Academie van Wetenschappen), Second Series, vol. ii.; the former is written in French, and titled: "Sur la détermination absolue de l'erreur personnelle dans les observations astronomiques;" the latter, in German: "Uebereinen neuen Apparat zur absoluten Bestimmung von persönlichen Fehlern bei astronomischen Beobachtungen." H. VON DE STADT, Ph.D.

Arnhem, Netherlands, January 3

Anatomical Lectures to Female Medical Students

I HAVE great pleasure in hearing that the Professors of Anatomy in Scotland have not all forgotten that women ought to be treated with some degree of chivalry.

Professor Struthers, of Aberdeen, and Professor Bell, of St. Andrews, hearing that the five ladies who are studying at the Edinburgh University are excluded from the opportunity of studying anatomy there, have severally offered their services as instructors. Many a lady will rejoice that the numbers of those willing and ready to help in the good cause of fuller knowledge for women are increased by two professors, who have bravely come forward with much moral courage and chivalrous feeling.

Edinburgh, Jan. 22.

A NON-MEDICAL WOMAN

NOTES

THE Physical Section of the Academy of Sciences at their last meeting recommended Professor Kirchhoff, of Heidelberg, to fill the place of correspondent of the section, vacant by the death of Principal Forbes. The other candidates were MM. Ångström, Billet, Dove, Grove, Henry (of Philadelphia), Jacobi, Joule, Lloyd (of Dublin), Riess, Stokes, Tyndall, Volpicelli, and Sir William Thomson.

IN our statement last week that "the Senate of London University has proposed to establish a Faculty of Science," "London University" should have been "University College, London;" the fact being that the Senate of the University of London—in advance of every other university of the kingdom—established a Faculty of Science *ten years ago*; constituting, at the suggestion, and with the advantage of the advice, of the ablest men of science in this country, a scheme for graduation in science, which has continued in efficient operation from that time to the present. And we may add that in the new building of the University the

four Faculties—Arts, Sciences, Law, and Medicine—are typified by the four sitting statues over the portico, representing Milton, Newton, Bentham, and Harvey.

WE are happy to be able to announce that the council of the Chemical Society has decided to have a report of their proceedings and an abstract of the papers read before the society drawn up immediately after its meetings, and to offer copies of this report to the editors of journals who may be likely to wish to publish it. The days when the newest results of science were regarded as something secret—or, at all events, of no concern to the ordinary man of education—are gone by, we trust, for ever. It may now be confidently expected that the example of the Chemical Society in thus seeking a wide publicity for the reports of their proceedings will be followed by those societies—such as the Linnean and the Astronomical—which have not offered hitherto such facilities to those who endeavour to inform the general scientific public and the world of letters of the latest researches in science.

WE learn from the fifth annual report of the Sanitary Commissioner with the Government of India, just received, that the first scientific report on the inquiry into epidemic cholera in India, the instructions for which were prepared by the Army Sanitary Commission, has been presented. The reporters state that they have been making “careful and systematic examinations of cholera excreta, and the changes taking place in them during decomposition as compared with healthy excreta, and the changes occurring in them as well as in other fluids and solids during the same process. These changes have been studied as occurring under various circumstances, associated with various substrata and media. In addition to the above experiments, others on the effects of cholera excreta on growing rice plants have been entered upon. Careful daily observations have been made, and notes and *camera lucida* drawings of all the changes observed to occur have been accumulated. As far as the observations have as yet gone, they have not been confirmatory of those of Hallier. For, though fungi have frequently appeared on choleraic materials, yet—(1) several species have appeared; (2) the same species have occurred in abundance on other substrata in like circumstances; (3) the species observed have not belonged to the cholera series of Hallier. As yet, however, it would be premature to draw any definite conclusions in the matter, as any series of observations on such points is beset with innumerable difficulties and fallacies, necessitating careful and frequent repetition of each experiment before coming to a final decision as to the value of its results.” Observations are being conducted at various stations to ascertain whether Pettenkofer's theory of the relation of cholera to subsoil water level is borne out in India.

THE Boston Society of Natural History, at its last meeting, passed the following vote:—

“That the net proceeds of the celebration of the centennial anniversary of the birth of Humboldt, together with the money received from the sale of Prof. Agassiz's Address, previous to Jan. 1, 1870, and the money subscribed at the solicitation of the society's committee, be given to the trustees of the Museum of Comparative Zoölogy at Harvard College, in trust, for the establishment of an endowment, under the title of the Humboldt Scholarship, the income of which is to be solely applied, under the direction of the Faculty, toward the maintenance of one or more young and needy persons engaged in study at said museum.”

THE subject of the Ravizza prize of a thousand lire for 1870 is, the effect which emigration to foreign countries and removal to cities produce on the population of agricultural districts. Manuscripts are to be marked with a motto, and accompanied by a sealed letter containing the author's name. They must be

written in Italian, addressed *Presidenza del Regio Liceo, Cesare, Beccaria, Milan*, and delivered not later than the last day of December next.

A MONTHLY Journal, devoted to social and sanitary economy, is advertised to appear on the 1st proximo, under the title of the *Food Journal*. Judging by the names included in the published list of contributors, we may confidently expect that the important subjects to be dealt with in this periodical will be treated of with ability, and in accordance with the most recent results of scientific research.

THAT interesting and useful periodical the *American Naturalist*, which is devoted to the popularisation of Natural History, commences a new volume in March next. The first article in the volume will be an illustrated paper by Mr. E. G. Squier, the eminent archæologist, on the Ancient Megalithic Monuments of Peru compared with those in other parts of the world. The second article will be on Sponges, by Prof. Leidy, of Philadelphia.

WE have received from the Mannheim Association for Natural Science the annual report published in February of last year, and giving an account of the society's operations during the year 1868-9. The usefulness of the Association appears to have been somewhat limited by the want of funds. To the same cause must doubtless be ascribed the fact that the only papers published with the report before us are on the meteorology of Mannheim. We are glad, however, to learn from the Secretary that the volume for 1870 will shortly appear, and that it is to contain several interesting astronomical, meteorological, and botanical communications.

M. DUMERIL, Member of the Institute and Professor at the Jardin des Plantes, commenced on the 15th inst. at the Museum of Natural History, a course of lectures on the general history of reptiles, batrachians, and fish.

MR. DYER, of Cirencester College, has been appointed by Earl De Grey to the Professorship of Botany in the Royal College of Science, Dublin.

IT was some time since announced that the prize offered by Lieut.-Colonel Scott, R.E., the secretary of the Royal Horticultural Society, for an essay on the Principles of Floral Criticism, would be awarded on January 19th. It is now stated that the award will not be made till Wednesday, May 4th, 1870.

WE note the appearance of a new edition of the very handy geological map of Germany, France, England, and the neighbouring countries, originally drawn up by Von Dechen in 1839. It will be found very useful to any continental tourists who have some geological knowledge, and who care to take an intelligent survey of the countries they travel through. Copies may be obtained of Messrs. Nutt, 270, Strand. The scale is 1:2,500,000.

A COMMITTEE has been formed at Liverpool for the purpose of establishing a Zoölogical Society. It is hoped that the corporation will grant a site for the society's garden in one of the public parks.

MELBOURNE has recently acquired a fresh utility and ornament in the shape of a turret-clock, the first manufactured in the colony, which for perfection of work and peculiarities of construction challenges the admiration of all horologists. The dials, six feet in diameter, consisting of frames of cast-iron—the rings, figures, and minute marks (eight inches long and one broad) all formed in one casting—are eighty feet from the level of Bourke Street. The weight is about 120 pounds, suspended on a barrel seventeen inches long and ten inches in diameter, revolving twenty-nine times a week, giving a downfall of about seventy feet. The pendulum swings once in two seconds, and consists of a dry and varnished pine rod fifteen feet six inches long, with a cylinder of lead weighing 320 pounds. As it was thought desirable to make the hands move by easily seen impulses every

half-minute, so as to ascertain the time to a second, a special arrangement, called a spring *remontoire*, has been added, by means of which the wheels of the clock are detained for thirty seconds and escape at the half-minute, allowing the weight to move the hands over half a minute's space, and wind up a small clock-spring in the spindle, which revolves in two minutes. This keeps the pendulum and the escapement going while the rest of the works are held back. The following is a technical description of this *remontoire*.—"The wheel in the spindle, which revolves once in five minutes, drives a second pinion with eight teeth, the spindle of which projects through the back of the clock frame, and carries a little cylinder with two notches at the end, one broad and shallow, the other narrow and deep. At the end of the *remontoire* arms are two steel projections, one of which passes through the broad notch and the other through the narrow one. As the two-minute spindle revolves, with the notched cylinder, it brings a notch in a right position to let one of the arm projections through every half-minute, allowing the train to move the hands, and wind up the small spring. To effect this the pinion with sixteen leaves is loose on the two-minute spindle, and is only attached to one end of the spring. The clock is also supplied with Denison's double three-legged gravity escapement.

THE Mount Washington Railway, which ascends the White Mountains, New Hampshire, U.S., is about three miles in length, the average gradient being a little more than 1 in 4, which is increased in some places to the extraordinary extent of 1 in 3. The engine draws itself up the line by means of a "pinion," which works into a strong "rack" fixed between the rails, and the ascent of three miles is completed in about one hour.

M. MOHN, Director of the Observatory of Christiania, has recently surveyed the *névé* field of Fostedalsbroen, which occupies 750 square kilometres. He finds that it feeds twenty-two glaciers of the first order and more than 200 smaller ones. The *névé* is seventy kilometres from the sea.

MESSRS. BELL AND DALDY have just issued the first part of a work bearing the title "Natural Phenomena and Chronology of the Seasons," and containing a chronological register of the remarkable frosts, droughts, thunderstorms, gales, floods, earthquakes, &c. which have occurred in the British Isles since A.D. 220. The author, Mr. E. J. Lowe, F.R.S., the well-known meteorologist, wishes it to be understood that his chief object in publishing what is confessedly a very imperfect record is to call attention to the subject, and elicit further information for a more extensive work, embracing the more remarkable natural phenomena of foreign countries. The compilation of a catalogue of this nature, if it is to be of any real benefit to science, involves an enormous amount of labour and much critical skill. The original authorities for the phenomena recorded should, in each case, be referred to so precisely that the quotations may be readily verified. It is hardly satisfactory to see the *Preston Herald* quoted in support of the assertion that 1,500 houses were unroofed and destroyed in London, in the year 944.

MR. JOHN H. MARTIN, secretary to the Maidstone and Mid-Kent Natural History Society, has just brought out the first number of a new publication, "Microscopic Objects figured and described," containing 16 wood-cuts and short descriptions of vegetable objects, from the yeast-plant to the spiral-vascular tissue from garden rhubarb. The work is intended, when complete, to contain about 200 figures, all of them original, to be issued in monthly numbers. It is proposed to commence with the primary forms of vegetable life, and to proceed onwards through the tissues to the woody structures of the Exogens and Endogens, next descending to the Acrogens, and so passing to the extreme limits of vegetable life, as the Desmidiæ, &c., thence

to the lower forms of animal life, the Infusoria, and on through the Radiata to the Insects, which will be drawn and described in their various orders, and the minute organs figured separately.

THE *Architect* states that Lieutenant Cole, R.A., and three sappers, sent out by the Secretary of State for India to take casts of the Sanchi Tope, have arrived in Calcutta. For the benefit of those of our readers who have not had the privilege of seeing Mr. Fergusson's magnificent work "On Tree and Serpent Worship," we may mention that the Sanchi Tope, a monument of very high antiquity, is surrounded by walls and gateways covered with elaborate sculptured decorations of the greatest interest to the student of the early history of the human race.

THE *Field* of Saturday last contains some interesting notes on special agricultural training-schools in France, Germany, and Switzerland. At Rütte in the Canton of Berne, and at Santhoven in Bavaria, particular attention is given to the theory and practice of dairy operations, and the general treatment of cow stock. The school of Lezardeau, on the estate of Count Conédic, in the Department of Finistère, offers special facilities for the study of draining and irrigation. In this school there is a technical library, a museum, a collection of meteorological instruments, a laboratory, and tools of all descriptions. The general course of study includes elementary mechanics, agricultural chemistry and botany, the pruning and grafting of fruit-trees, the making of roads, and other practical knowledge. At Görtz, in Austria, is a special institution for silkworm culture, supporting a journal exclusively devoted to that branch of industry. The *Athenæum* states that the Ottoman Government is giving its support to a project of M. Netter, of Constantinople, to found an agricultural school for Jews in Palestine.

We have been requested to notify that the following premiums have been placed at the disposal of the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce, for the term of seven years, by M. Septimus Piesse:—1. A premium of £5, for one pound of Otto of Bergamot, of the value of 16s. or more in the London market, being the produce of plants (*Citrus bergamia*) grown in Australia, New Zealand, Natal, any of the British West India Islands, or any other British Colony or Dependency. 2. A premium of £5, for one ounce of Otto of Roses, of the value of 20s. or more in the London market, being the produce of any variety of roses grown together in one plantation in Australia, New Zealand, Natal, any of the British West India Islands, or any other British Colony or Dependency. 3. A premium of £10, for a canister of Enflowered Butter or Fat, so scented with any kind or sort of flower, either by infusion or enfleurage, or by means of these processes jointly, of the weight of 3 lbs. or more, and of the value of 6s. per lb. in London. The said butter or fat to be enflowered or infused with flowers grown for the purpose in Australia, New Zealand, Natal, any of the British West India Islands, or any other British Colony or Dependency.

ON HAZE AND DUST

SOLAR light in passing through a dark room reveals its track by illuminating the dust floating in the air. "The sun," says Daniel Culverwell, "discovers atoms, though they be invisible by candle-light, and makes them dance naked in his beams."

In my researches on the decomposition of vapours by light, I was compelled to remove these "atoms" and this dust. It was essential that the space containing the vapours should embrace no visible thing; that no substance capable of scattering the light in the slightest sensible degree should, at the outset of an experiment, be found in the "experimental tube" traversed by the luminous beam.

For a long time I was troubled by the appearance there of floating dust, which, though invisible in diffuse daylight, was at